

WHAT IS CLAIMED IS:

1. An apparatus for processing a surface of an inhabitable structure, the apparatus comprising:

a laser base unit adapted to provide laser light to an interaction region, the laser light removing material from the structure, the laser base unit comprising a laser generator and a laser head coupled to the laser generator, the laser head adapted to remove the material from the interaction region, thereby providing reduced disruption to activities within the structure;

an anchoring mechanism adapted to be releasably coupled to the structure and releasably coupled to the laser head; and

a controller electrically coupled to the laser base unit, the controller adapted to transmit control signals to the laser base unit in response to user input.

2. The apparatus of Claim 1, wherein the laser head is releasably coupled to the laser generator and the controller is releasably coupled to the laser base unit, whereby the apparatus can be reversibly assembled and disassembled to facilitate transportation of the apparatus to locations in proximity to or within the structure.

3. The apparatus of Claim 1, wherein the laser generator comprises an arc-lamp-pumped Nd:YAG laser.

4. The apparatus of Claim 1, wherein the laser generator comprises a fiber laser.

5. The apparatus of Claim 1, wherein the laser head comprises laser optical elements adapted to receive laser light from the laser generator and to direct the laser light to the interaction region.

6. The apparatus of Claim 1, wherein the laser head comprises a containment plenum adapted to confine the material and to remove the material from the interaction region.

7. The apparatus of Claim 6, wherein the containment plenum is further adapted to reduce noise and light emitted out of the containment plenum from the interaction region.

8. The apparatus of Claim 6, wherein the containment plenum comprises an extraction port which provides a pathway for removal of the material from the containment plenum.

9. The apparatus of Claim 6, wherein the containment plenum comprises a resilient interface adapted to contact the structure and to substantially surround the interaction region, thereby facilitating confinement and removal of material from the interaction region.

10. The apparatus of Claim 9, wherein the resilient interface comprises a wire brush.

11. The apparatus of Claim 1, wherein the laser head comprises a nozzle fluidly coupled to a compressed gas supply, the nozzle adapted to direct a compressed gas stream to the interaction region.

12. The apparatus of Claim 1, wherein the anchoring mechanism comprises one or more resilient vacuum pads coupled to at least one vacuum generator.

13. The apparatus of Claim 1, further comprising a detector coupled to the controller and adapted to detect embedded material in the structure while processing the structure, and to transmit detection signals to the controller, the controller adapted to avoid substantially damaging the embedded material by transmitting appropriate control signals to the laser base unit.

14. The apparatus of Claim 13, wherein the detector is adapted to detect embedded material by using light emitted by the interaction region during processing.

15. An apparatus for processing a surface of an inhabitable structure with reduced disruption to activities within the structure, the apparatus comprising:

means for generating laser light;

means for providing the laser light to an interaction region of the structure to remove material from the structure;

means for confining the material and removing the material from the interaction region; and

means for controlling the laser light in response to user input.

16. A method of processing a surface of an inhabitable structure with reduced disruption to activities within the structure, the method comprising:

remotely generating laser light;

providing the laser light to the surface, the laser light interacting with the structure in an interaction region to remove material from the structure;

confining the material and removing the material from the interaction region;
and

controlling the laser light in response to user input.

17. An apparatus for processing a surface of an inhabitable structure, the apparatus comprising:

a base unit adapted to provide energy waves to an interaction region, the energy waves removing material from the structure, the base unit comprising a generator and a head coupled to the generator, the head adapted to remove the material from the interaction region, thereby providing reduced disruption to activities within the structure;

an anchoring mechanism adapted to be releasably coupled to the structure and releasably coupled to the head; and

a controller electrically coupled to the base unit, the controller adapted to transmit control signals to the base unit in response to user input.

18. The apparatus of Claim 17, wherein the energy waves are electromagnetic waves.

19. The apparatus of Claim 17, wherein the energy waves are ultrasonic waves.

20. The apparatus of Claim 17, wherein the energy waves are acoustic waves.